ELECTRONICS

MICROPROCESSOR TEMPERATURE CONTROLLER

SP24I+

LOGIC

SERVICE MANUAL
WARRANTY CARD

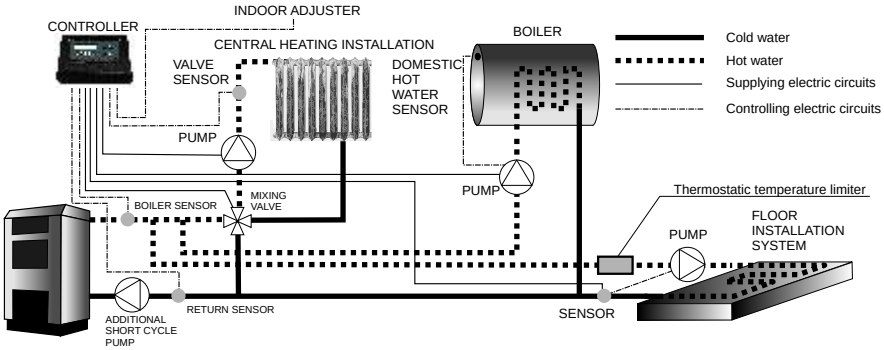
1. Front panel description

Controller view with marked functions

1. Turning on (hold ENTER button for 2 sec.).
2. LCD display.
3. Indicator lights.
4. Device control buttons.
5. Airflow start up indicator.
6. Central heating pump start up indicator.
7. Hot service water pump start up indicator.
8. Floor pump start up indicator.
9. Loader start up indicator.
10. 7A fuse.

2.Application

The device is intended for controlling the boiler with automatic fuel feeding. The controller has an innovative controlling Logic system, the system operates on the basis of steady power control in the boiler.
The devices automatically changes the airflow power and dispenses an adequate fuel amount so that the energy generated during the combustion process is used maximally.
The control process is performed on the basis of a measurement of the temperature of the central heating.



3. Keys.

The device has four keys intended for its operation:

The key (ENTER) – switching on the device, entering the menu, saving a parameter.

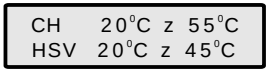
The key (EXIT) – monitoring the boiler, exit without saving changes.

The key (△), scrolling through the menu, changing parameters, adjusting the temperature of the central heating, switching on/off the summer mode.

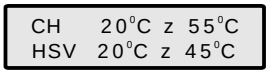
The key (▽), scrolling through the menu, changing parameters, adjusting the temperature of domestic hot water, enabling/disabling the domestic hot water function.

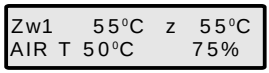
4.Start-up and operation.

STARTING UP THE DEVICE- Press and hold the key (ENTER).
After starting up, a central heating and domestic hot water temperature is screened on the LCD display, the device starts to operate.

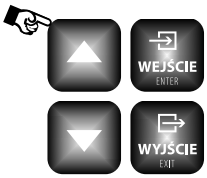


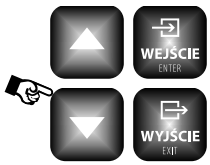
CHANGE OF MONITORING THE BOILER- Change of reading after pressing the key (ENTER).
Monitoring the central heating and domestic hot water temperature, Current power in the boiler, monitoring the valve operation.

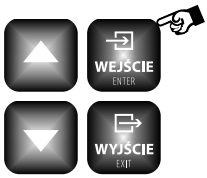


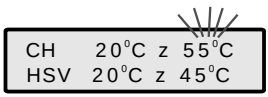


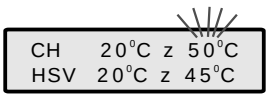
CHANGE OF THE CENTRAL HEATING TEMPERATURE.- Press the key (△) , the central heating temperature is flashing on the display, Select the appropriate temperature,(△) (▽) confirm by pressing the key (ENTER)

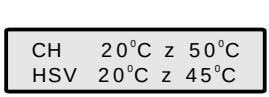




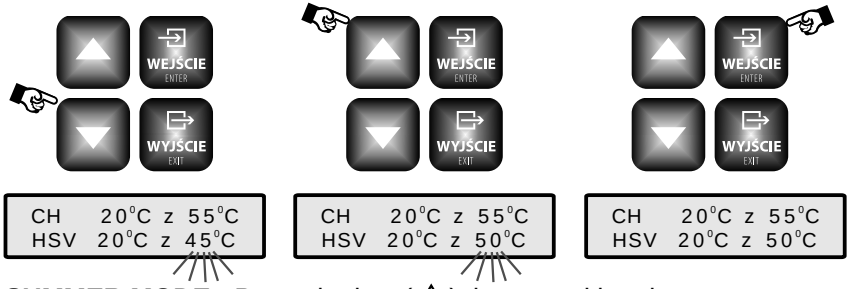




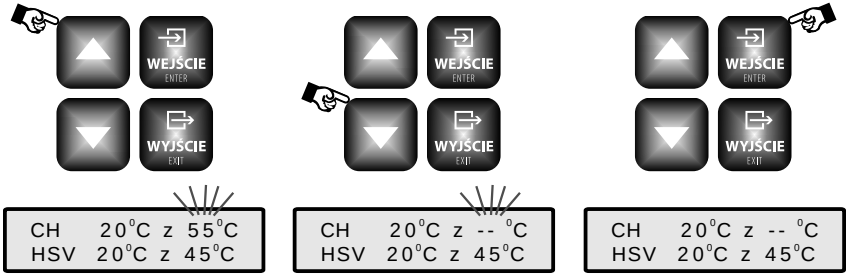




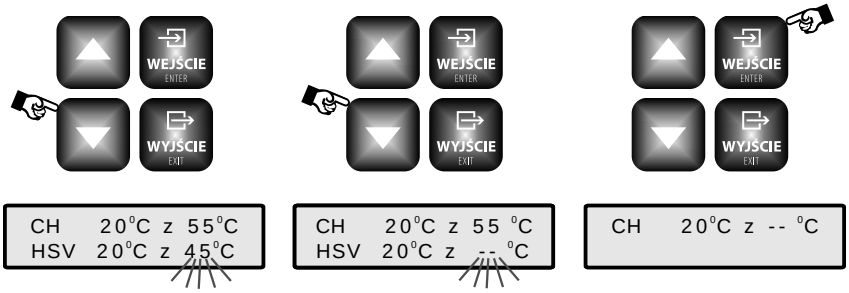
CHANGE OF THE DOMESTIC HOT WATER TEMPERATURE – Press the key (▽),the domestic hot water temperature is flashing on the display. Select the appropriate temperature,(▽) (△)confirm by pressing the key (ENTER)



SUMMER MODE - Press the key (△),the central heating temperature is flashing on the display. Press and hold the key (▽), release it when two horizontal lines appear on the display instead of the temperature. Confirm by pressing the key (ENTER)

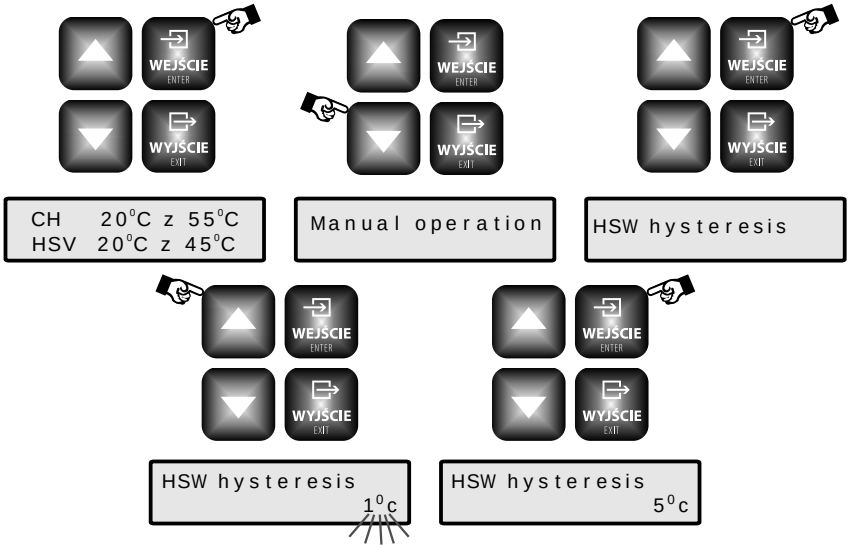


SWITCHING ON THE DOMESTIC HOT WATER PUMP. - Press the key (▽),the domestic hot water temperature is flashing on the display. Press and hold the key (▽), release it when two horizontal lines appear on the display instead of the temperature. Confirm by pressing the key (ENTER)



5.Menu

ENTERING THE MENU - Press the key (ENTER). The keys (△) (▽) are intended for scrolling through the menu. Entering next sub-menu and confirming a selected parameter, press the key (ENTER). Exiting the menu, press the key (EXIT) Domestic hot water hysteresis.



-MANUAL OPERATION – enables an independent start-up of each of the devices cooperating with the controller, i.e. airflow, feeder and three temp. measurements (central heating, domestic hot water, floor)

-DOMESTIC HOT WATER HYSTERESIS – enables to adjust a delay of starting up the domestic hot water pump by a set number of degrees, e.g. while 2ºC hysteresis and 50ºC set temperature, the pump starts up, when the domestic water temperature drops to 48ºC.

-CENTRAL HEATING/DOMESTIC HOT WATER PRIORITY- the device controls three pumps (central heating, domestic hot water, floor). The function lets determine a sequence of starting up individual pumps.

DOMESTIC HOT WATER PRIORITY – in the domestic hot water priority, domestic hot water pump starts up as the first one and operates until a set temperature is not reached in the storage container. When the temperature is reached, the pump switches off and central heating and floor pump start up.

The central heating pump works incessantly, whereas the floor pump will switch off when it reaches the set temperature. While working in the domestic hot water priority mode, the adjuster maintains the temperature by 10ºC higher than the set one in the boiler in order to heat up rapidly the storage container. The domestic hot water priority function is equipped with the following safety functions:

- lack of starting up the domestic hot water pump when the temperature of hot water storage container is higher than the temperature of the water jacket in the boiler.

-emergency start-up of the central heating pump while heating up domestic water when the temperature in the water jacket in the boiler exceeds 82ºC.

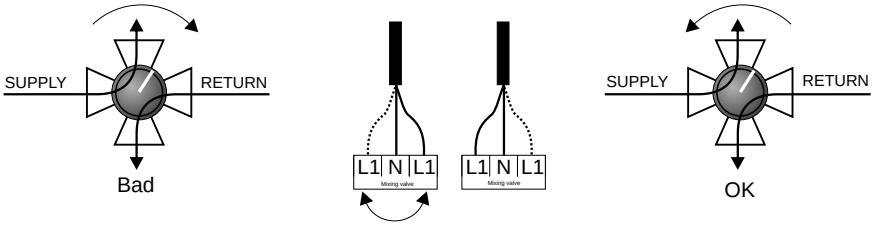
CENTRAL HEATING PRIORITY- in the central heating priority, the three pumps start up simultaneously when the temperature in the boiler reaches 35 ºC. The central heating pump works incessantly, whereas the domestic hot water and floor pump start up when they reach the set temperature. In the central heating priority there is no possibility to adjust a domestic hot water temperature higher than the central heating temperature. The central heating priority function is equipped with the following safety function:
- lack of starting up the domestic hot water pump when the temperature of hot water storage container is higher than the temperature of the water jacket in the boiler.

-VALVE 1 the device is equipped with an outlet enabling connection and operation of a mixing valve. The valve is intended for maintaining the appropriate set water behind the valve at the outlet of the system. After connecting the valve, sensors and selecting the type of the supported system, calibration should be carried out.

VALVE TYPE selection of valve type. The device displays the possibility to support two types of heating systems; a central heating system and floor heating system. In this function, the system, in which the valve will operate, is selected.

VALVE CALIBRATION the valve is set manually to 50% opening and calibrations is started. Set <YES> and confirm by pressing the key ENTER, the device will automatically carry out calibration. If the boiler (central heating) temperature is higher than 5ºC, the device will not carry out calibration. When the display shows 100%, calibration will be finished, exit with the key EXIT.

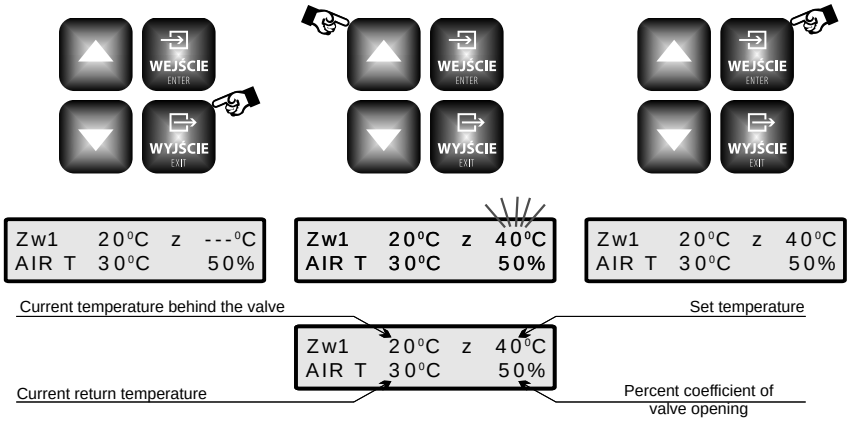
CAUTION attention should be paid to a operation direction of the valve. At first stage of calibration, the valve should be set to 100% flow for the i nstallation system, if otherwise and the valve is set to 0% flow, calibration should be interrupted and the operation direction of the valve should be changed by switching the cables on the mounting bar of the controller.



RETURN TEMPERATURE the function protects the boiler from premature corrosion maintaining the appropriate temperature water return from the system. The recommended return temperature is determined by a boiler manufacturer,

CAUTION maintaining the return temperature is superior (priority) after enabling the function, the central heating temperature should be modified. The temperature is set by minimum 10ºC higher than the set return temperature. The lack of a modification of the central heating temperature will cause a heat deficiency in the system.

TO SWITCH ON THE MIXING VALVE – Enter the monitoring of the valve, press the key (ENTER).
Next, using the keys (△)(▽) set a temperature behind the valve and press the key (ENTER).



-FUEL TYPE switching the type of fuel used, e.g.: 1) pallet, 2) coal dust. The controller allows to adjust the suitable parameters of the boiler operation for each fuel separately, depending on the type used. The types of fuel is earlier adjusted in the function FUEL 1/2/3/4 in the installation menu.

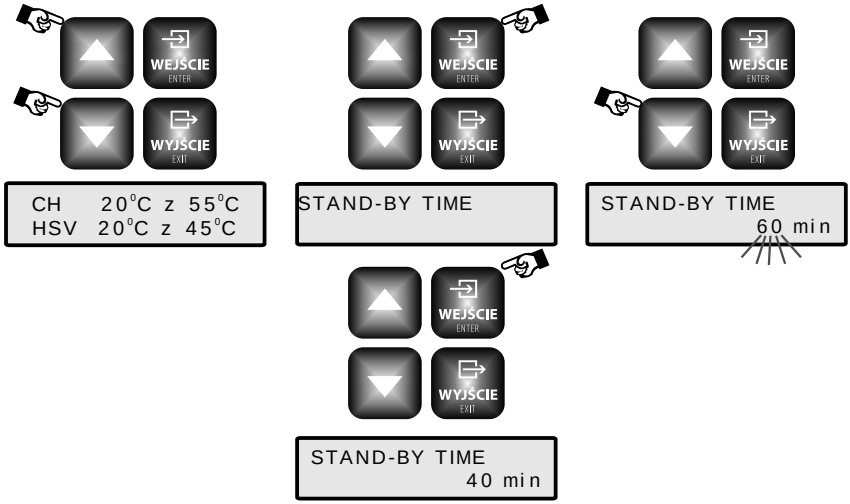
- FLOOR HEATING the controller is equipped with the function of controlling the floor pump. It is equipped with an output supplying the pump and floor sensor that is mounted on the return of the floor installation system.The system also requires installation of a thermostat limiting the supply temperature. Controlling the pump can also be used with a mixing valve mounted for operation in the floor mode.

- FACTORY SETTINGS the controller has the programmed factory settings, after enabling the function and selecting the commend (YES) in the menu, they will be recalled.

- OPERATION END switching off the controller, after enabling the function and selecting the commend (YES) in the menu, the device switches to the stand-by mode, it protects the boiler from boiling and the fuel tank from catching fire.

6. Installation menu

ENTERING THE INSTALLATION MENU – Simultaneously press and hold the keys (△)(▽).The keys (△) (▽) are intended for scrolling through the menu. Entering next sub-menu and confirming a selected parameter, press the key (ENTER). Exiting the menu, press the key (EXIT)



- STAND-BY TIME is a function responsible for an interruption of the boiler operation when there is no fuel or the fuel feeder is blocked. Set time measured by the controller when the central heating temperature does not increase and remains within the range 0ºC to 5 ºC below the temperature in the central heating

- SUPPORT PAUSE

- SUPPORT OPERATION both parameters concerns an operation in the summer mode. They are responsible for dispensing an appropriate amount of fuel in order to maintain a fire in the combustion chamber after heating up the domestic water. There are two parameters that are inextricably linked together. The pause is responsible for a break that is determined in minutes and the operation is determined as a time of operation of the feeder and fan. It is determined in seconds. These two parameters should be set so that the boiler does not go dead while on support.

- FAN START-UP the device automatically adjusts an adequate rotational speed of the fan, the function of airflow start-up is responsible for a start of the fan alone, it is based on adjusting an adequate start time determined in seconds. The time should be set so that the fan reaches the maximum rotational speed while starting. The parameter set in this way will allow to avoid any problems with the device for a long period of its use.

- INDOOR ADJUSTER the device offers the possibility to connect an indoor thermostat responsible for maintaining the temperature within the rooms heated. The room thermostat controls the operation of the central heating. It switches on or switches off the pump depending on the temperature. When the thermostat is connected to the adjuster, yes should be pressed in the function. An arrow will appear in the upper right corner on the display.

CAUTION!!! the function should not be enabled when no indoor thermostat connected.

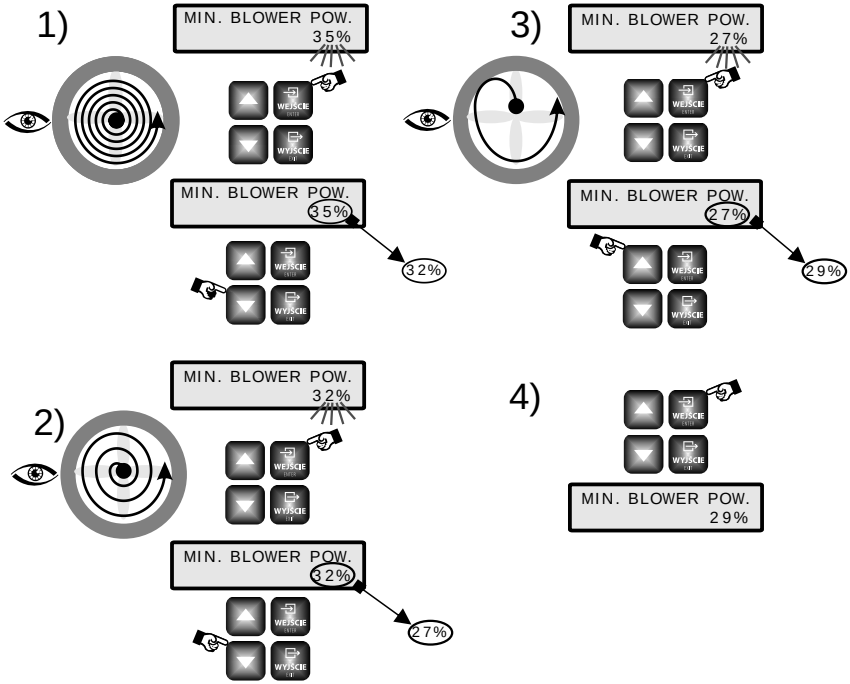
- WORM TEMPERATURE the function together with the sensor placed on the pipe of the feeder allows to protect the boiler from an embers/fire return to the fuel storage container. When the temperature measured on the sensor exceeds the set value, the error E7 'Temperature of the worm sensor too high' will appear on the display. The airflow will be switched off, the feeder will start transporting the fuel.

FUEL COMBUSTION SETTINGS MODIFICATION

Two checkup tests should be introduced to each of the types of fuel that is supposed to be burnt, a minimum power test and maximum power test

for the boiler. The test is based on adjusting an adequate amount of the fuel for two limit value of the boiler power. The boiler power is an air amount distributed to the hearth through the fan. For the parameters: **Min fan power**, e.g. (15%) and **max fan power** e.g.: (99%), an adequate amount of fuel is adjusted. An adequate adjustment and proper testing ensure a steady power adjustment and the adequate amount of transported fuel within the full range of the boiler operation (15% - 99%).

- MINIMUM FAN POWER the parameter is intended for determining a minimum fan rotational power (minimum boiler power). This value is determined once for a particular fan type. The value should be set so that the rotor's blades operate with the lowest rotational speed as possible. You cannot overdo it, the rotor must be working! Stopping the rotor will cause a break in oxygen transportation, which will result in incorrect fuel combustion on the hearth an disable proper testing for the **minimum power**. In order to determine correctly the minimum fan power, using the keys (△)(▽) the parameter should be set and then the key ENTER should be pressed. The device will perform the test. The parameter should be determined on the basis of an observation of the rotational speed of the fan's rotor.



- FUEL 1 Settings modification for the first fuel.

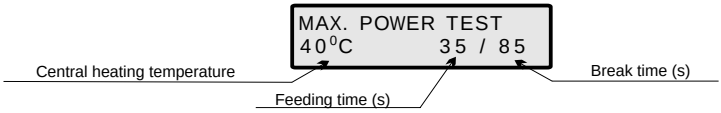
- MAXIMUM FAN POWER the parameter is intended for determining a maximum fan rotational power (maximum boiler power) for the parameter 'first fuel'.The value of the maximum power is conventionally (99%) for eco-pea coal. In the case of light fuels such as pallet there may be a need to limit the amount of air distributed to the hearth because of blowing the light fuel around the combustion chamber.

- MINIMUM POWER TEST is aimed at determining an adequate fuel amount which will be burnt on the hearth in an optimal way! The fuel amount should be determined on the basis of an observation, if the fuel runs through as not fully burnt, its amount is decreased, but when the fuel runs out and the flame moves back to the feeder's pipe, the amount is increased. Changes should be made every hour since the last modification. Every time it is determined if the fuel amount is adequate. After finding a correct setting, the test is allowed to last for more 2-3 hours. After this period, the settings are verified one more time by checking the combustion chamber.

If the result of this modification is satisfying, the test is finished by confirming with the key ENTER and the maximum power test is then carried out.

- MAXIMUM POWER TEST is aimed at determining an adequate fuel amount which will be burnt on the hearth in an optimal way! The fuel amount should be determined on the basis of an observation, if the fuel runs through as not fully burnt, its percent amount is decreased, but when the fuel runs out and the flame moves back to the feeder's pipe, the amount is increased. Changes should be made more or less every 20-30min since the last modification. Every time it is determined if the fuel amount is adequate. After finding a correct setting, the test is allowed to last for more 60min. After this period, the settings are verified one more time by checking the combustion chamber. If the result of this modification is satisfying, the test is finished by confirming with the key ENTER.

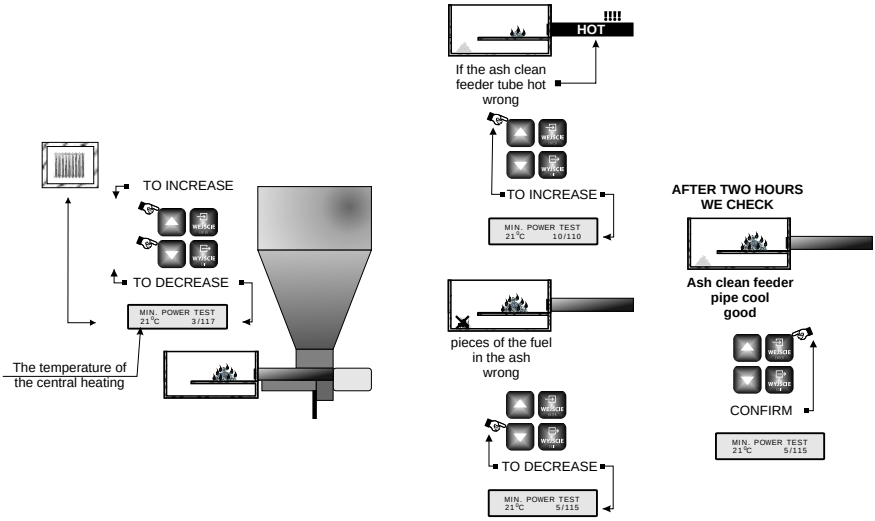
Caution! While modifying the amount of the fuel transported, changes should not be confirmed with the key Enter. The amount of the transported fuel is modified when the parameter is modified on the display!



While testing, there is also the parameter of the boiler temperature on the display except for the parameter of break and time of the transported fuel. A reading of the current temperature is only informative and does not influence the process of adjusting the fuel amount to any extent.

Caution! carrying out the tests, especially the maximum power test, one should allow the central heating system to receive the maximum amount of heat, since the boiler generates the maximum power while the test is in progress. To do so, while testing, one should:

- set the thermovalves in all the radiators to the full flow.
-if there is such a possibility, open the windows in all the rooms heated.



- LANGUAGE language selection

7. Technical data

1. CH temperature adjustment range 35°C - 80°C.
2. HSW temperature adjustment range 35°C - 65°C.
3. HSW floor adjustment range 20°C - 55°C.
4. Automatic blower adjustment.
5. Operation in ambient temperature 0°C - 40°C.
6. Automatic saving of settings during supply voltage decay.
7. Relative air humidity 95%.

8. I insulation class.
9. 7 A fuse.
10. Controller has got function preventing from premature freezing of installation, in case oftemperature decrease below 6^{O}C circulation pump starts up automatically.
11. Controller is equipped with secondary protection (emergency thermostat) which protects the boiler against overheating

8. Use

1. Connect feeder of CH and HSW pump.
   a) yellow-green conductor to earth terminal,
   b) blue conductor to "N" terminal,
   c) brown conductor to "L" terminal.
2. After connecting the blower, pumps and after installing all sensors turn the
   controller on. After performing above actions the controller ensures:
   a) maintaining constant temperature of CH boiler set up by user.
   b) automatic start of pumps and blower.
   c) automatic shutdown of the blower and pumps after fuel use up.
   d) continuous readout of temperatures.

9. Errors

Error 0 – Device failure.
Error 1 – EEPROM memory failure.
Error 2 – Central heating temperature sensor failure.
Error 3 – Domestic hot water temperature sensor failure.
Error 4 – Worm temperature sensor failure
Error 5 – Floor pump sensor failure.
Error 6 – Central heating temperature too high.
Error 7 – Worm temperature too high.
Error 8 – Domestic hot water temperature too hot.
Error 9 – No fuel.
Error 11 – Valve 1 sensor failure
Error 12 – Valve 1 actuator failure
Error 13 – Valve 1 current sensor failure

10. Fuse replacement

To replace the fuse disconnect the feeder from the socket.

11. Installation recommendations

1. Controller installation should be entrusted to authorized person.
2. Controller should be placed in location disabling it becoming heated above 40^{O}C
3. Perform installation in accordance with par. 5 (Use)
4. Device should be installed and operated in accordance with rules of operating electrical devices. Controller must not be exposed to water or to conditions causing steam condensation i.e. rapid changes of ambient temperature.
5. In cases of controller misoperation first check:
   a) the fuse
   b) connections stability and technical condition of cooperating devices, that means the blower, pumps.
   c) Set the controller to manufacturer settings.
6. Boiler should have check valves installed in cycles of CH and HSW pumps..

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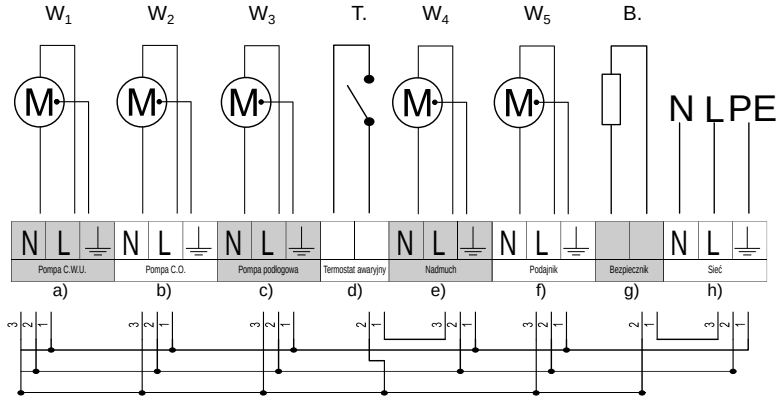
CAUTION!!!
Perform connecting blower and circulation pumps motors only after disconnection of the controller from 230V supply network.

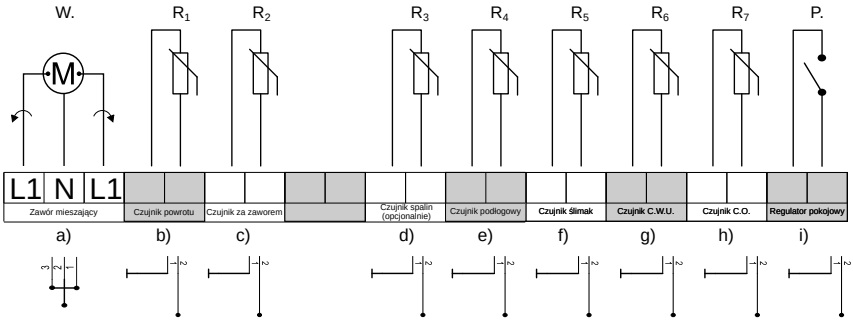
ELECTRICAL CONNECTION SCHEME



a) Domestic hot water pump
b) Central heating pump
c) Floor pump
d) Emergency thermostat
e) Airflow
f) Feeder
g) Fuse
h) Mains

PE - (yellow-green)
N - (blue)
L - (brown)

W_{1-5} / 230 V AC
T. / STB.94 ^{0}C
B. / 7.5 A



a) Mixing valve
b) Sensor behind the valve
c) Return sensor
d) Fumes sensor (optional)
e) Floor sensor
f) Worm sensor
g) Domestic hot water sensor
h) Central heating sensor
i) Indoor adjuster

W. / 230 V AC

R_{1-7} = 10 kΩ / 25 ^{0}C

P.

12. Electric parameters

1. Supply voltage	~ 230 V / 50 Hz
2. Power consumption (no ratings)	2 W
3. Output ratings:	
blower	100 W
loader	100 W
pumps	
CH	100 W
HSW	100 W
floor	100 W

10. Warranty card

1. Manufacturer guarantees good quality of equipment, guarantee and post-guarantee services.
2. Manufacturer grants the guarantee of failure-free controller operation for the period of 24 month from purchase date.
3. Failures and damages revealed during warranty period shall be eliminated immediately, free of charge within not longer than 14 days from the day of delivering the device for repair at manufacturer location.
4. Shipment costs are incurred by the customer.
5. When making a complaint failure description should be attached.
6. Warranty does not include damages arose due to improper operation by the user or modifications and repairs performed not by service centre.
7. Seller is obliged to fill in the warranty card on the day of giving out the equipment. Warranty card which is not filled in or having any corrections or cross outs precludes exercising warranty rights.

Information on utilization of electric and electronic devices

This symbol placed on products or documentation attached to them informs that unserviceable electric or electronic devices must not be thrown away together with garbage. Proper behaviour in case of necessity of utilization, reuse or components recovery consists in handing over the device to specialized collection point where you shall not be charged. Proper utilization of the device enables preservation of valuable resources and avoidance of negative effect to the health and environment. Detailed information about the nearest collection point may be obtained from your local authorities.

Producent:
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